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ABSTRACT

This study examined the cognitive effects of fraternity/sorority affiliation on 2,293 first-year college students at 18 four-year institutions in 15 states. It assessed the net affects of Greek affiliation on standardized measures of reading comprehension, mathematics, and critical thinking, and sought to determine if the cognitive impacts of Greek affiliation differed for students in different institutional contexts or for students with different characteristics. The study found that Greek-affiliated men had significantly lower end-of-first-year scores on standardized measures of reading comprehension, mathematics, critical thinking, and composite achievement than their non-Greek counterparts. The impact of Greek affiliation on non-white males, however, was slightly positive. Women who joined sororities had lower end-of-first-year scores on all four cognitive measures than non-Greek women, but only the differences in reading comprehension and composite achievement were statistically significant. The findings suggest that the normative peer culture and socially-orientated time commitments of Greek life often are inconsistent with the educational and intellectual mission of colleges and universities. (Contains 50 references.) (MDM)

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COGNITIVE EFFECTS OF GREEK AFFILIATION DURING THE FIRST YEAR OF COLLEGE*

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Introduction

Social fraternities and sororities (commonly referred to as Greek organizations) are a visible, yet often controversial, aspect of student life at many colleges and universities. Some observers assert that these organizations are antithetical to the educational purposes of postsecondary institutions (cf, Maisel, 1990), while others claim that Greek affiliation can lead to positive educational outcomes (Kuh & Lyons, 1990; Pike & Askew, 1990). The purpose of this article is to describe a study of the cognitive effects of Greek affiliation on a national sample of first-year students.

Background of the Study

A modest but growing body of research addresses the impact of affiliation with social sororities and fraternities on the outcomes of college. Most of this research has focused on non-cognitive outcomes, including student satisfaction (Pennington, Zvonkovic, & Wilson, 1989), leadership (Astin, 1977; Dollar, 1966), academic success (Baird, 1969, Kaludis & Zatkin, 1966; Parrino & Gallup, 1988; Prusok & Walsh, 1964; Willingham, 1962), and campus involvement (Pike & Askew, 1990; Williams & Winston, 1985). The impact of Greek membership on student behaviors such as alcohol consumption (Goodwin, 1989; Kodman & Sturmak, 1984; Tamke, 1990), academic dishonesty (Jendrek, 1992), and persistence in college (Astin, 1975), also has been studied.

Another small body of research focuses on the impact of Greek affiliation on developmental outcomes of college, such as autonomy and principled moral reasoning (Kilgannon & Erwin, 1992; Pascarella & Terenzini, 1991). The research on autonomy suggests that Greek-affiliated students are less autonomous -- and place a lower value on autonomy and personal independence -- than their non-Greek counterparts (e.g., Cohen, 1982; Eddy, 1990; Hughes & Winston, 1987; Lemire, 1979; Wilder, Hoyt, Surbeck, Wilder, & Carney, 1986; Winston & Saunders, 1987). Design limitations of these studies, however, prevent knowing if the apparent effect is due to socialization or recruitment. That is, do fraternities and sororities discourage autonomy in their members, or do they recruit students who are less autonomous than students who choose not to affiliate?

Evidence from studies of the influence of Greek affiliation on moral reasoning is equivocal. Cohen (1982) and Marlowe and Auvenshine (1982) found no significant differences in level of moral reasoning between Greek-affiliated students and their non-Greek counterparts. More recently, Sanders (1990) reported that non-Greek freshmen men had higher levels of principled moral reasoning than did their Greek peers. Again, the designs of these studies preclude separating socialization effects of fraternities and sororities from the background characteristics of the students they attract and/or recruit.

Design limitations of the aforementioned studies were eliminated in a longitudinal study by Kilgannon and Erwin (1992). The researchers used statistical controls for initial level of moral reasoning on Rest's 1974) Defining Issues Test and found that sorority members had lower moral reasoning scores after two years of college than non-Greek women. Results of a comparison between Greek and non-Greek men also indicated lower reasoning scores for fraternity members, but the differences were not statistically significant.

Despite recent concerns about college and university accountability and calls to assess the cognitive outcomes of college (e.g., Astin, 1991; Banta and Associates, 1993; Erwin, 1991; Ewell & Lisensky, 1988; Pascarella & Terenzini, 1991), there has been very little research about the effects of Greek affiliation on learning and cognitive development. A few studies have examined the relationship between Greek affiliation and academic performance as reflected in grades (e.g., Baird, 1969; Kaludis & Zatkin, 1966; Pike & Askew, 1990; Prusok & Walsh, 1964; Willingham, 1962), but results of this research are inconclusive. Note, too, that serious questions have been raised about the appropriateness of grades as a measure of cognitive development (see Pascarella & Terenzini, 1991 for a review of the literature on the reliability and validity of grades).

An exemplary longitudinal investigation by Pike and Askew (1990) studied the effects of Greek affiliation on cognitive growth (e.g.,

intellectual and analytical skills, communication, reasoning, problem-solving) using the College Outcomes Measures Project (COMP) Objective Test developed by the American College Testing Program (Forrest & Steele, 1982). In the presence of statistical controls for secondary school grades, entering ACT scores and parents' education and income, students in Greek organizations had significantly lower COMP-total scores than their non-Greek counterparts.

Although the Pike and Askew (1990) study is a good example of how to validly assess the impact of Greek affiliation it, too, has limitations. First, because the study was conducted at a single institution, it cannot tell us how or whether institutional differences (e.g., academic selectivity) might have differential influences on the cognitive impact of Greek affiliation (Pascarella & Terenzini, 1991). Second, although Pike and Askew did control for the potential impact of students' initial academic ability (as measured by ACT scores), they were unable to control for such variables as ethnicity, age, place of residence, work responsibilities, full or part-time enrollment, and types of courses taken. Any or all of these variables might affect the relationship between Greek affiliation and cognitive growth. Finally, the Pike and Askew study employed a single measure of global cognitive growth (i.e., the COMP total score). Therefore, their findings cannot tell us if the effect of Greek affiliation is generally the same across

all types of cognitive growth or if it differs for different cognitive outcomes.

The study described in this article sought to add to knowledge in this area of inquiry and address some of the limitations of previous research by providing a longitudinal and multi-institutional investigation of the cognitive effects of Greek affiliation during the first year of college. The study had two specific aims: (1) to assess the unique (or net) effects of Greek affiliation on standardized measures of reading comprehension, mathematics, and critical thinking, and (2) to determine if the cognitive impacts of Greek affiliation differed for students in different institutional contexts and/or for students with different characteristics. This research was part of the National Study of Student Learning (NSSL), a three-year longitudinal investigation of the factors that influence learning and cognitive development in college, sponsored by the National Center on Postsecondary Teaching, Learning, and Assessment (NCTLA).

Method

Institutional Sample

Eighteen four-year colleges and universities in fifteen states participated in the study. Institutions were selected from the National Center on Educational Statistics Integrated Postsecondary Education Data System (IPEDS) data base to represent differences in colleges and universities nationwide on a variety of characteristics,

including institutional type and control (e.g., private and public research universities, private liberal arts colleges, public and private comprehensive universities, historically black colleges), size, location, commuter or residential character, and the ethnic distribution of the undergraduate student body. The aggregate student population of the eighteen schools approximated the national population of undergraduates in ethnicity and gender.

Student Sample

Each of the eighteen institutions was given a target sample size comparable in magnitude to the size of the first-year class at each institution. The total target sample for the first data collection was 3,910; the obtained sample (i.e., those students actually tested) for the initial data collection was 3331 (85.19%). Students in the sample were informed that they would participate in a national longitudinal study of student learning and would receive a small stipend from the NCTLA for their participation. They also were advised that the information they provided would be kept confidential and would never become part of their institutional record.

Instruments and Testing

The initial data collection was conducted in the Fall of 1992 and lasted approximately three hours. Students were asked to provide information about their precollege demographic characteristics and backgrounds, as well as their aspirations, expectations of college,

and orientations toward learning. Participants also completed Form 88A of the Collegiate Assessment of Academic Proficiency (CAAP), developed by the American College Testing Program (ACT) to assess general cognitive skills typically acquired by students in the first two years of college (ACT, 1989). The total CAAP consists of five 40-minute, multiple-choice test modules, three of which--reading comprehension, mathematics, and critical thinking--were administered during the Fall 1992 NSSL data collection.

The CAAP reading comprehension test has 36 items that assess skill in inferring, reasoning, and generalizing. The test consists of four prose passages of about 900 words in length designed to be representative of the level and kinds of writing commonly encountered in college curricula. The passages were drawn from topics in fiction, the humanities, the social sciences, and the natural sciences. The KR-20, internal consistency reliabilities for the reading comprehension test range between .84 and .86.

The CAAP mathematics test consists of 35 items designed to measure ability to solve mathematical problems encountered in many postsecondary curricula, and emphasizes quantitative reasoning rather than formula memorization. The content areas tested include pre-, elementary, intermediate, and advanced algebra, coordinate geometry, trigonometry, and introductory calculus. The KR-20 reliability coefficients for the mathematics test ranged between .79 and .81.

The CAAP critical thinking test is a 32-item instrument that

measures ability to clarify, analyze, evaluate, and extend arguments. The test consists of four passages designed to be representative of issues commonly encountered in postsecondary curricula, including case studies, debates, dialogues, overlapping positions, statistical arguments, experimental results, or editorials. Each passage is accompanied by a set of multiple choice items. The KR-20 reliability coefficients for the critical thinking test ranged from .81 to .82 (ACT, 1989). In a pilot test of various instruments for use in the National Study of Student Learning, the critical thinking test of the CAAP was found to correlate .75 with scores on the Watson-Glaser Critical Thinking Appraisal.

Follow-up testing of the sample took place in the spring of 1993. This data collection required about 3 1/2 hours and consisted of Form 88B of the CAAP reading comprehension, mathematics, and critical thinking modules as well as a questionnaire to measure students' experiences during the first year of college.

Of the 3331 students who participated in the first data collection, 2416 participated in the follow-up (72.53%). Given the high response rates at both testings it is not particularly surprising that the participants were reasonably representative of the population from which they were drawn. However, the follow-up sample was weighted to adjust for potential response bias by gender, ethnicity, and institution. If, for example, an institution had 100 Black men in its first-year class and 25 Black men in the sample,

each Black male in the sample was given a sample weight of 4.00. An analogous weight was computed for participants falling within each gender x ethnicity cell for each institution.

Of the 2,416 students participating in the follow-up testing, complete data were available for 2,293 students. Based on the weighted sample, these 2,293 students represented a population of 24,508 students in the first-year classes at the eighteen participating institutions.

Research Design

The study design was a pretest- posttest quasi-experimental design in which statistical controls were made for salient precollege (Fall 1992) and other variables. The comparison groups were men and women who reported in the follow-up testing that they had joined a social fraternity or sorority during the first year of college and their counterparts who did not affiliate with a Greek organization.

Dependent variables were Spring 1993 scores on the CAAP reading comprehension, mathematics, and critical thinking tests. A measure of first-year composite achievement that combined all three tests also was developed to provide a global measure of learning. The composite achievement measure was constructed in two steps: (1) each of the three CAAP tests (i.e., reading, mathematics, and critical thinking) was standardized to put each on the same metric, and (2) the composite achievement score was computed by summing the

standardized scores. The internal consistency reliability for the composite achievement measure was .83.

Evidence about the factors that independently influence learning and cognitive development during college (e.g., Astin, 1968, 1977, 1993; Astin & Panos, 1969; Kuh, 1993; Pascarella & Terenzini, 1991) informed selection of control variables:

1. Individual Fall 1992 CAAP reading comprehension, mathematics, critical thinking, and composite achievement scores (each employed in analysis of the appropriate CAAP follow-up (Spring 1993)).

2. Precollege (Fall, 1992) academic motivation as measured by an eight-item, Likert-type scale (5 = strongly agree to 1 = strongly disagree) developed for the NSSL and based on research on academic motivation (e.g., Ball, 1977). Examples of items included: "I am willing to work hard in a course to learn the material, even if it won't lead to a higher grade," "When I do well on a test it is usually because I was well prepared, not because the test was easy," "In high school I frequently did more reading in a class than was required simply because it interested me," and "In high school I frequently talked to my teachers outside of class about ideas presented during class." Internal consistency reliability of the scale was .65.

3. Ethnicity (i.e., non-white and white).

4. Age.

5. Number of credit hours taken (i.e., total number of credit hours each student expected to complete during the first year of college (taken from the follow-up questionnaire)).

6. Number of hours worked (i.e., total number of hours a student worked per week in both on and off campus employment (taken from the follow-up questionnaire).

7. On- or off-campus residence(taken from the follow-up questionnaire).

8-12. Number of courses taken during the first year of college in (1) natural sciences and engineering (e.g., biology, chemistry, engineering, geology, physics); (2) arts and humanities (e.g., art history, composition, English literature, foreign languages, philosophy, classics); (3) social sciences (e.g., economics, psychology, history, sociology, political science, social work); (4) mathematics (e.g., algebra, calculus, statistics, computer science, geometry, matrix algebra); and (5) technical or pre-professional (e.g., business, education, physical education, nursing, physical therapy, drafting). Respondents were to indicate, from 61 different courses across the five areas, how many of courses they had taken during the first year of college. This information was taken from the follow-up questionnaire.

Because the existing body of evidence suggests that institutional context can play a role in shaping the impact of

college in indirect, if not direct, ways, we also included one institutional-level variable in the analytic model:

13. The average level of academic preparation of each institution's first-year class, estimated by the average precollege (Fall, 1992) CAAP reading comprehension, mathematics, critical thinking, or composite cognitive achievement score for the sample of first-year students at each of the eighteen institutions. Each student in the sample was assigned the mean of his or her institution on all three CAAP tests plus the composite, and each of the institutional mean estimates was employed in analysis of the appropriate end-of-first-year (Spring 1993) individual-level reading comprehension, mathematics, critical thinking, or composite achievement score. Inclusion of this variable in the analytic model served also as a control for the potential confounding effect of differential levels of Greek affiliation at colleges with different levels of student body selectivity.

Data Analysis

The first stage in the analysis estimated the impact of Greek affiliation on cognitive outcomes while controlling for potential confounding influences -- that is, the thirteen variables identified above. By means of ordinary least-squares regression, each of the four end-of-first-year cognitive outcomes (i.e., Spring 1993 reading comprehension, mathematics, critical thinking, and composite

achievement) was regressed on the potentially confounding influences, as well as on a variable indicating whether or not the student had joined a fraternity or sorority during the first year of college.

In the second stage of the analysis we tested for the presence of conditional effects (Pedhazur, 1982): the possibility that the magnitude of the impact of Greek affiliation is different for students with different characteristics. A series of cross-product terms was computed between the Greek/non-Greek variable and each of the other thirteen variables in the model. These were then added to the regression model employed in the first stage of the analysis (the main-effects model). The cross-products were added separately for men and women. A statistically significant increase in explained variance (R^2) attributable to the set of cross-product terms (over and above the main-effects model) indicated that the net effects of Greek affiliation vary in magnitude for students at different levels on other variables in the prediction model. The nature of statistically significant individual conditional effects could then be examined.

Results

Impact of Greek Affiliation

Tables 1 and 2 illustrate the regression analysis summaries for the four end-of-first-year cognitive measures for men and women. As Table 1 indicates, in the presence of controls for all other variables in the prediction model, joining a fraternity during the

first year of college has a significant negative impact on all four cognitive outcomes for men.

The corresponding analysis for women (see Table 2) shows that joining a sorority during the first year of college also has a negative influence on cognitive development, but only the effects for reading comprehension and composite achievement are statistically significant.

Place Tables 1 & 2 About Here

An additional analysis was conducted to estimate the dependent variable means of Greek and non-Greek students, adjusted for the influence of all other variables in the regression equation shown in Tables 1 and 2. These adjusted means and standard deviations are displayed in Table 3. To estimate the magnitude of the net cognitive disadvantage accruing to Greek-affiliated students (compared to their independent counterparts) we computed the effect size of the difference between the adjusted means of Greek and non-Greek students. Effect size was operationalized as the difference between adjusted means divided by the standard deviation of the non-Greek group (Glass, 1977; Glass, McGaw, & Smith, 1981; Light & Pillemer, 1982; Walberg, 1985). We assumed that the Greek students were exposed to socialization experiences not shared by the non-Greek students. Therefore, Greek students were analogous to a treatment or

experimental group, whereas the non-Greeks were analogous to a control group.

Place Table 3 About Here

The effect size of cognitive disadvantages for men who joined fraternities during the first year of college (expressed as z-scores) were: reading comprehension = .17 of a standard deviation (SD), mathematics = .14(SD), critical thinking = .27(SD), and composite achievement = .20(SD). The average disadvantage across all four cognitive outcomes was .20 of a standard deviation. By converting these effect sizes to percentile points under the normal distribution, we estimated the percentile-point disadvantage for Greek-affiliated men. For example, an effect size disadvantage of .17 of a standard deviation in reading comprehension converts to 6.75 percentile points. Therefore, if the average non-Greek male performs at the 50th percentile in reading comprehension, the average Greek male performs at about the 43rd percentile. The remaining percentile-point cognitive disadvantages for Greek men were: mathematics = 5.57 percentile points, critical thinking = 10.64 percentile points, composite achievement = 7.93 percentile points. The average across all four cognitive tests was 7.93 percentile points.

For women, the effect sizes and corresponding percentile point cognitive disadvantages associated with Greek affiliation were, with the exception of reading achievement, somewhat smaller than those for men. Effect size disadvantages were: reading comprehension = .20(SD), mathematics = .05(SD), critical thinking = .12(SD), composite achievement = .13(SD), and the average across all four cognitive outcomes = .13(SD). The corresponding percentile-point cognitive disadvantages for women who joined sororities were: reading comprehension = 7.93 percentile points, mathematics = 2 percentile points, critical thinking = 4.78 percentile points, and composite achievement = 5.17 percentile points. The average percentile point disadvantage for sorority members across all four cognitive outcomes was 5.17 percentile points.

Another analysis was conducted to determine if the negative cognitive effects of Greek affiliation differed in magnitude for men and women. In all cases, the cross product of gender x Greek affiliation was non-significant (although for mathematics, critical thinking, and composite achievement the probability of a chance difference was less than .10). Thus, although the average negative cognitive effects of Greek affiliation tended to be larger for men than for women, the magnitude of the differences was not statistically significant.

Conditional Effects

In the second stage of the analysis we examined the possibility that the impact of Greek affiliation differed for different students. The addition of the cross-product terms to the main-effects equation was associated with small (average R^2 increase = 1.32%), but statistically significant, increases in explained variance in all four analyses for men. This finding indicates that Greek affiliation did have different effects on cognitive outcomes for different types of men. The corresponding analyses for women yielded non-significant R^2 increases.

In order to identify the nature of the differential effects of Greek affiliation for men, individual cross-product terms for men were examined. Our examination revealed one significant ($p<.01$) conditional effect in each of the four analyses conducted: Greek-affiliation x ethnicity. The male sample was then disaggregated by ethnicity and analyses were conducted separately for White men and men of color to determine the nature of the significant conditional effect. The metric regression coefficients from those analyses are shown in Table 4. As the Table indicates, there were dramatic differences in the magnitude of the cognitive effects of fraternity membership for White men and men of color. That is, fraternity membership had a strong negative influence on all four cognitive outcomes for White men, but a modest positive influence for men of color.

Place Table 4 About Here

Discussion

Summary

This eighteen-institution investigation sought to determine the cognitive effects of Greek affiliation during the first year of college. In the presence of controls for such potentially confounding influences as precollege cognitive level and academic motivation, the average cognitive level of the incoming class at each institution, ethnicity, age, extent of enrollment, work responsibilities, place of residence, and patterns of coursework taken, Greek-affiliated men had significantly lower end-of-first-year scores on standardized measures of reading comprehension, mathematics, critical thinking and composite achievement than their non-Greek counterparts.

Analyses for women yielded similar, though less dramatic, negative effects. Women who joined sororities had lower end-of-first-year scores on all four cognitive measures than non-Greek women, but only the differences in reading comprehension and composite achievement were statistically significant.

Additional analyses revealed that, for men, ethnicity influenced the magnitude and nature of the cognitive effects of Greek membership. Joining a fraternity had a strong negative effect on all four cognitive outcomes for White men, but a modest positive influence on all four cognitive outcomes for men of color.

Interpretation and Implications

General effects of Greek affiliation. The results of this study generally are consistent with and extend the findings of the small amount of research on the cognitive impacts of Greek affiliation. Recall that Pike and Askew (1990) found in their single-institution study that Greek affiliation can have negative effects on the cognitive development of students by the time they are seniors in college. The present multi-institution findings suggest that the negative cognitive impact of Greek affiliation is evident as early as the end of the first year of college. Other previous research (e.g., Pascarella, Brier, Smart, & Herzog, 1978; Walberg & Tsai, 1983) indicates such discernible differences after only one year of exposure to college may well be the first stage in a process that produces a serious cumulative disadvantage that is likely to increase in magnitude over time. Future analyses in the NSSL will examine whether negative effects of Greek membership persist and/or are enhanced over time for this sample.

The findings also suggest that, while fraternities and sororities can develop roles that "provide unusually rich out-of-

class learning and personal development opportunities for undergraduates" (Kuh & Lyons, 1990, p. 20), the normative peer culture and socially-oriented time commitments of Greek life often are inconsistent with the educational and intellectual mission of the institution (Maisel, 1990; Strange, 1986). One need only examine recent catalogues or bulletins of undergraduate institutions or the work of the recent National Education Goals Panel (1991) to see "critical thinking" or a closely related term employed to define one of the essential outcomes of an undergraduate education. Yet, in the present study, fraternity membership had its strongest negative influence on first year critical thinking. The 10.64 percentile point disadvantage in end-of-first-year critical thinking accruing to Greek men was 1.58 times as large as the negative effect of fraternity membership on reading comprehension and 1.91 times as large as the negative effect on mathematics.

Reviews of the college impact literature by Feldman and Newcomb (1969) and Pascarella and Terenzini (1991) indicate that the first year of college is a particularly important time in the lives of students. It is in the first year that students face tasks of adjustment to the academic demands of postsecondary education, cultivate effective study habits and time management, and further develop assumptions about and expectations for their educational experiences in college. Involvement in fraternities (and to a lesser extent in sororities) during this period may seriously detract from

the time required to become successfully integrated into academic life. Indeed, our findings suggest that student involvement in Greek life during the first year of college has implications for intellectual growth that are so antithetical to higher education's academic mission that the practice of freshman-year rush and first-year new member activities should be reconsidered.

The NSSL findings also support calls (e.g., Kuh & Lyons, 1990; Maisel, 1990) to examine the practices, traditions, and expectations of fraternities and sororities to determine whether they are compatible with institutional educational goals and values. In addition, the effects of Greek affiliation on students' cognitive development at individual institutions ought to be considered. Evidence of negative cognitive effects and/or lack of compatibility with institutional purposes should lead to a re-examination of the role of Greek life in the institution. Does Greek affiliation have educational benefits that merit retaining fraternities and sororities? Can current fraternity and sorority practices and traditions be altered to enhance students' cognitive outcomes? What new practices and structures should be mandated?

Conditional effects. Recall that our study revealed differences in the impact of Greek membership on first-year cognitive outcomes for White men and men of color. For White men, Greek affiliation had a strong negative impact, but for men of color, fraternity membership was associated with a modest positive impact. This finding

reinforces the notion that the impact of any particular college experience may differ substantially in the nature and magnitude of its influence for different kinds of students (Pascarella, 1987; Pascarella & Terenzini, 1991). Failure to consider the possibility of such conditional effects could well lead, as in the present study, to a masking of important complexities in the impact of specific college experiences for different kinds of students.

The NSSL data cannot tell us whether the fraternities to which the NSSL students belonged were predominantly White, predominantly of color, or both. Also not apparent in the data are reasons for the differences between effects of Greek membership for men of color and White men. Evidence reported by Whipple, Baier, and Grady (1991), however, suggests a possible explanation. They found that Black students who joined fraternities had a stronger orientation to academic life than their White counterparts. Thus, students of color (the majority of whom were Black in our sample) may form a subculture within fraternities that is more supportive of the intellectual mission of the institution than the dominant peer culture of White fraternity men. If that is the case, the fraternity experiences of students of color should be further examined to determine what can be learned from them that might be useful in altering student cultures for White men.

Limitations

This investigation has several limitations that should be kept in mind when interpreting the findings. First, although the overall sample is multiinstitutional and consists of a broad range of four-year institutions from around the country, the fact that the analyses were limited to 18 colleges and universities means that we cannot necessarily generalize the results to all four-year institutions. Similarly, while attempts were made in the initial sampling design, and subsequent sample weighting, to make the sample as representative as possible at each institution, the time commitment and work required of each student participant undoubtedly led to some self-selection. We cannot be sure that those who were willing to participate in the study responded in the same way as would those who were invited but declined to participate in the study. Weighed against this, however, is the fact that we found no significant conditional effects involving such factors as age, precollege cognitive level or academic motivation, extent of enrollment, place of residence, work responsibilities or kinds of courses taken. Thus, even if the sample had some bias on these factors it did not appear to have an appreciable influence on the study results. Third, although we looked at three important measures of learning and cognitive growth in college (reading comprehension, mathematics, and critical thinking), these are certainly not the only dimensions along which students develop intellectually during the college years.

Alternative conceptualizations or approaches to the assessment of cognitive development might have produced findings different from those yielded by this investigation.

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TABLE 1
REGRESSION ANALYSIS SUMMARIES FOR MEN[a]

PREDICTOR	READING COMPRE-HENSION	MATHE-MATICS	CRITICAL THINKING	COMPOSITE ACHIEVE-MENT
Individual Precollege Reading Comprehension, Mathematics, Critical Thinking, or Composite Achievement	.651** (.655)	.684** (.682)	.729** (.668)	.270** (.797)
Average Precollege Reading Comprehension, Mathematics, Critical Thinking or Composite Achievement for First-Year Students at Each Institution	.364** (.171)	.259** (.154)	.294** (.131)	.038** (.119)
Precollege Academic Motivation	-.033 (-.003)	.062 (.007)	.076 (.007)	.007 (.004)
Non-White	-.349 (-.029)	-.418* (-.045)	-.944** (-.078)	-.035 -.020
Age	.084** (.059)	-.031 (-.028)	.044 (.030)	.004 (.021)
Number of Credit Hours Taken	.101 (.025)	.058 (.018)	.367** (.089)	.019 (.033)
Number of Hours Worked	.017 (.008)	-.139** (-.086)	-.082 (-.033)	-.010 (-.035)
On-Campus Residence	-.053 (-.005)	-.668** (-.079)	-1.014** (-.093)	-.097** (-.063)

TABLE 1 (continued)

PREDICTOR	READING COMPREHENSION	MATHEMATICS	CRITICAL THINKING	COMPOSITE ACHIEVEMENT
Number of Courses Taken in the Natural Sciences or Engineering	.121 (.032)	.183** (.060)	.060 (.015)	.011 (.019)
Number of Courses Taken in the Arts and Humanities	.080 (.034)	-.003 (-.002)	.146** (.061)	.009 (.027)
Number of Courses Taken in the Social Sciences	.081 (.026)	-.142** (-.057)	.111 (.035)	-.002 (-.004)
Number of Courses Taken in Mathematics	.064 (.014)	.301** (.087)	.236* (.050)	.040** (.060)
Number of Courses Taken in Technical/Professional Areas	-.218* (-.052)	-.038 (-.011)	-.253* (-.059)	-.018 (-.030)
Joined a Fraternity	-1.101* (-.056)	-.679* (-.047)	-1.568** (-.085)	-.170** (-.065)
R^2	.612**	.713**	.639**	.797**

*Top number is the metric or unstandardized regression coefficient, bottom number is the standardized regression coefficient.

*$p < .05$

**$p < .01$

TABLE 2

REGRESSION ANALYSIS SUMMARIES FOR WOMEN[a]

PREDICTOR	READING COMPREHENSION	MATHEMATICS	CRITICAL THINKING	COMPOSITE ACHIEVEMENT
Individual Precollege Reading Comprehension, Mathematics, Critical Thinking, or Composite Achievement	.582** (.583)	.608** (.656)	.722** (.675)	.258** (.781)
Average Precollege Reading Comprehension, Mathematics, Critical Thinking or Composite Achievement for First-Year Students at Each Institution	.193** (.091)	.274** (.167)	.155** (.069)	.019** (.059)
Precollege Academic Motivation	-.163 (-.016)	.087 (.011)	.188 (.017)	.004 (.003)
Non-White	-1.986** (-.183)	-.667** (-.080)	-.757** (-.067)	-.136** (-.088)
Age	.002 (.002)	-.039** (-.051)	.020 (.019)	-.000 (-.003)
Number of Credit Hours Taken	.440** (.112)	.148** (.050)	.313** (.077)	.040** (.072)
Number of Hours Worked	-.013 (-.007)	-.015 (-.010)	-.058 (-.029)	-.004 (-.014)
On-Campus Residence	.076 (.008)	-.113 (-.015)	-.300 (-.028)	-.028 (-.020)

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TABLE 2 (continued)

PREDICTOR	READING COMPREHENSION	MATHEMATICS	CRITICAL THINKING	COMPOSITE ACHIEVEMENT
Number of Courses Taken in the Natural Sciences or Engineering	.016 (.004)	.133** (.047)	.196** (.052)	.011 (.021)
Number of Courses Taken in the Arts and Humanities	-.000 -.000	-.081** (-.049)	.028 (.013)	-.005 (-.017)
Number of Courses Taken in the Social Sciences	.115* (.043)	-.088** (-.042)	.106 (.038)	.005 (.014)
Number of Courses Taken in Mathematics	-.064 (-.014)	.441** (.129)	.016 (.004)	.020 (.031)
Number of Courses Taken in Technical/Professional Areas	-.183 (-.037)	-.094** (-.051)	-.377** (-.074)	-.035** (-.049)
Joined a Sorority	-1.088** (-.055)	-.242 (-.016)	-.684 (-.033)	-.100** (-.038)
R^2	.570**	.683**	.605**	.766**

*Top number is the metric or unstandardized regression coefficient, bottom number is the standardized regression coefficient.

*p < .05
**p < .01

TABLE 3

ADJUSTED MEANS ON FOUR END-OF-FIRST-YEAR COGNITIVE MEASURES FOR GREEK-AFFILIATED AND INDEPENDENT STUDENTS

GENDER/GROUP	READING COMPREHENSION	MATHEMATICS	CRITICAL THINKING	COMPOSITE ACHIEVEMENT
MEN				
Joined a Fraternity				
Mean	62.24*	60.43*	61.74**	.103**
SD	6.02	5.00	6.50	.941
Remained Independent				
Mean	63.25*	61.11*	63.31**	.273**
SD	5.80	4.70	5.89	.840
WOMEN				
Joined a Sorority				
Mean	62.10**	58.29	62.22	.042**
SD	5.97	4.28	5.88	.822
Remained Independent				
Mean	63.19**	58.53	62.90	.142**
SD	5.38	5.00	5.58	.762

*Significant difference between adjusted means for Greek-affiliated and independent students at $p < .05$
**Significant difference between adjusted means for Greek-affiliated and independent students at $p < .01$

TABLE 4

METRIC REGRESSION COEFFICIENTS FOR SIGNIFICANT CONDITONAL EFFECTS OF FRATERNITY MEMBERSHIP X ETHNICITY

FRATERNITY MEMBERSHIP	READING COMPREHENSION		MATHEMATICS		CRITICAL THINKING		COMPOSITE ACHIEVEMENT	
	WHITE	NON WHITE	WHITE	NON WHITE	WHITE	NON WHITE	WHITE	NON WHITE
Joined a Fraternity = 2; Remained Independent = 1	-1.392[a]	.347[a]	-.952[b]	.235[b]	-2.318[c]	.341[c]	-.246[d]	.069[d]

Note: Regression coefficients with the same superscript are significantly different in magnitude at $p < .01$ with the influence of all oher variables in the regression model controlled statistically.